

DETAILED ACTION

1. In view of applicant's argument, previous 102(b) rejection on claims 20-22 over Mastrangelo et al'212 and 103(a) rejection on claims 13-17 and 20-22 over Mastrangelo'212 in view of Lee'000 are hereby withdrawn. As argued by applicant, Mastrangelo's microfluidic device with an open channel as the final product would still have inlets and outlets unlike present structures of claims 20-22. Also, as argued by applicant, Mastrangelo does not teach or suggest present thermal decomposing step of claim 14.
2. As previously stated, the effective filing date of present claim 9 is October 16, 2003 because the provisional application 60/418,930 does not provide adequate support for the present compound, 2-benzyl-2-dimethylamino-1-(4-mopholinophenyl)-butanone-1. Applicants argue that although such compound is not specifically mentioned in the provisional application, the application defines photoinitiators broadly in the first paragraph of pg. 5 and provides citations 8 and 9 for specific identification of materials and methods employed.

However, under 35 U.S.C. 119(e), the written description and drawing(s) (if any) of the provisional application must adequately support and enable the subject matter claimed in the nonprovisional application that claims the benefit of the provisional application. In *New Railhead Mfg., L.L.C. v. Vermeer Mfg. Co.*, 298 F.3d 1290, 1294, 63 USPQ2d 1843, 1846 (Fed. Cir. 2002), the court held that for a nonprovisional application to be afforded the priority date of the provisional application, "the specification of the provisional must contain a written description of the invention and

the manner and process of making and using it, in such *full, clear, concise, and exact terms*,' 35 U.S.C. § 112 ¶1, to enable an ordinarily skilled artisan to practice the invention claimed in the nonprovisional application."

Also, 37 CFR 1.57 (c) states that "[e]ssential material " may be incorporated by reference, but only by way of an incorporation by reference to a U.S. patent or U.S. patent application publication, which patent or patent application publication does not itself incorporate such essential material by reference (for the definition of "essential material" see 37 CFR 1.57(c) (1)-(3)).

For the reasons stated above, the effective filing date of present claim 9 is still October 16, 2003.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claim 9 is rejected under 35 U.S.C. 102(b) as being anticipated by Teng (US 6,410,208 B1).

In Example 5, Teng teaches a thermo-deactivatable photosensitive layer comprising a thermo-deactivatable photopolymer formulation and a photoinitiator, 2-benzyl-2-N,N-dimethylamino-1-(4-morpholinophenyl)-1-butanone. Teng's thermo-deactivatable photopolymer is photohardenable before an IR radiation exposure and then becomes non-photohardenable in the exposed areas upon the IR radiation exposure (see col.4, lines 1-7). The area exposed to IR radiation is later removed in a development step (see col.14-26). Thus, Teng's thermo-deactivatable polymer teaches present thermally decomposable sacrificial polymer of claim 9.

6. Claim 9 is rejected under 35 U.S.C. 102(e) as being anticipated by Kohl et al (US 2006/0263718 A1)

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Kohl teaches a sacrificial composition containing a sacrificial polymer and negative tone photoinitiator such as Irgacure 819 or Irgacure 369 (see [0035] and [0046]). Thus, Kohl teaches present invention of claim 9.

7. Claim 9 is rejected under 35 U.S.C. 102(a) as being anticipated by Wu et al ("Photoinitiation Systems and Thermal Decomposition of Photodefinable Sacrificial Materials", Journal of Applied Polymer Science, Vol.88, pg.1186-1195 (2003)).

Wu teaches a norbornene-based photosensitive sacrificial materials including bis(2,4,6-trimethylbenzoyl)-phenylphosphine epoxide (see abstract). Wu also teaches present photoinitiator 2-benzyl-2-dimethylamino-1-(4-morpholinophenyl)-butanone-1 (Irgacure 369) in Table I. Thus, Wu teaches present invention of claim 9.

8. Claims 20-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Gallagher et al (US 2004/0137728 A1 – which effective filing date is September 13, 2002).

Gallagher et al teaches (see claim 1) a method forming an air gap in a device including the steps of: a) disposing a sacrificial material layer on a device substrate; b) disposing a porous overlayer material on the sacrificial material layer' and then c) removing the sacrificial material layer to form an air gap. Gallagher teaches (see claim 5 and [0069]) that the sacrificial material can be photoimageable and thus it may be imaged by exposing it to actinic radiation through a *mask*, followed by development.

Gallagher teaches that his sacrificial material is removed by heating (see [0067]) at a temperature of 225° to 400°C. Since claims 20-22 are product-by-process claims, Gallagher's device including the air gap teaches present structure of claims 20-22.

Claim Rejections - 35 USC § 103

9. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

10. Claims 14-17 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gallagher et al (US 2004/0137728 A1 – which effective filing date is September 13, 2002) in view of Lee et al (6,107,000).

Gallagher et al teaches (see claim 1) a method forming an air gap in a device including the steps of: a) disposing a sacrificial material layer on a device substrate; b) disposing a porous overlayer material on the sacrificial material layer' and then c) removing the sacrificial material layer to form an air gap. Gallagher teaches (see claim 5 and [0069]) that the sacrificial material can be photoimageable and thus it may be imaged by exposing it to actinic radiation through a *mask*, followed by development.

Gallagher does not teach the use of a gray scale photomask. Lee teaches that by using a gray scale mask in fabricating micro-devices, one can avoid the alignment errors resulting from processes requiring the use of multiple binary masks (see col.2, lines 17-23). Since Gallagher does not specify the type of mask he uses for the photolithography process (also, Gallagher's method is used for making electronic devices such as micro-electrical mechanical devices – see [0019]), it would have been obvious to one skilled in the art to use a gray scale mask in exposing Gallagher's sacrificial material to radiation so as to avoid the alignment errors as taught by Lee.

Gallagher teaches that his sacrificial material is removed by heating (see [0067]) at a temperature of 225° to 400°C. Thus, Gallagher in view of Lee would render obvious present inventions of claims 14-22.

Response to Arguments

11. Applicants argue that Teng does not teach present photodefinable polymer including a thermally decomposable sacrificial polymer. However, as explained above, Teng's thermo-deactivatable photopolymer is photohardenable before an IR radiation exposure and then becomes *non-photohardenable* in the exposed areas *upon the IR*

radiation exposure. The area exposed to IR radiation is later removed in a development step. Thus, Teng's thermo-deactivatable polymer teaches present thermally decomposable sacrificial polymer of claim 9.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Sin J. Lee/
Primary Examiner, Art Unit 1795
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